Greedy Algorithms

Group Assignment

Report

SCS 2201 - Data Structures and Algorithms II

Question 02

Candidate Set:

Students of the class.

Initialised an array based on the seated positions of the students and their scores are considered for selection.

Selection Function:

Considering two students seated next to each other and comparing their performance based on the scores obtained. One with the highest mark will get more masks.

Feasibility Function:

As it mentioned in the question , every student must get at least one mask so every student will add at least one unit(masks) to the solution.

Objective Function:

As the teacher wants to buy minimum number of masks , first two students will get one or two masks according to their performance*. Afterwards if the next student is performance is better than the previous one (since only considering two students seated next to each-other each time) he/she will one more mask than the previous one. If equal no change in number of masks. If less will only get one mask*(in order to minimise the number of masks must be bought).

Pseudo Code:

```
SET total_masks = 0
    while( x < number of students):
        if(first two students):
            student with the higher mark -> 2 masks
            student with the lesser mark -> 1 mask
            total_masks += 3
        else if(not first two but performance is better than previous):
            student gets -> previous student's masks+1
            total_masks += previous student's masks+1
```

CONTINUED…

else if(not first two but performance is lesser than previous):

student gets -> 1 mask

total_masks += 1

else //performance equal

student gets -> previous student's masks

total_masks += previous student's masks

Solution Function:

Once all the students have been considered the number of the masks that should be bought is calculated. It will get printed.

*** :** As a greedy technique is used the number of masks which are selected are local optimal solutions which would eventually lead to a global optimal solution. Global solution may not be the most optimal solution.

Question 03

Candidate Set:

The Products which are ready to ship.

Initialised an array to contain the candidate set.

Selection Function:

The products that are ready to ship must be categorise as a container can only contain products that are within the range of "*minimum weight to minimum weight + 4 units*"

Sorted the candidate set in ascending order to get the minimum values first. Selected the first minimum weighted product as the best fit.

Feasibility Function:

Since a minimum weighted product has been already chosen wrote a function to determine the feasibility of the remaining candidates to go into the container.If the a product exceeds the limit of weight it will be put into another container which will be done in the selection function.

Objective Function:

Once a minimum value is chosen a container is reserved for it. Another container will be allocated once a product is found, weight is greater *minimum weight + 4*

Pseudo Code:

```
temp_val = 0
while( x < number of products):
    if(weight[x](sorted weights in Ascending) > temp_val):
        temp_val = weight[x] + 4
        number of containers ++
    end if
end while
```

Solution Function:

Once all the candidates' feasibility have been checked, number of containers that should be allocated have been determined. The determined value will get printed.